5975 Series Mass Selective Detectors

Hardware Installation

Agilent Technologies

Notices

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

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1 General Information

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This section provides information on how to identify specifically what type of MSD you are working with as well as how to properly clean and dispose of the instrument. Also included in this section are the "Important Safety Warnings" which list critical safety precautions for all users.

Introduction

This document provides installation instructions for the Agilent Technologies 5975 Series Mass Selective Detector (MSD). Installation must be performed by an Agilent Technologies service representative.

The Agilent Technologies 5975 Series Mass Selective Detectors (MSDs) are diffusion and turbo pump MSDs.

The 5975 Series MSD system consists of:

NOTE Mix and match of the combinations below may not be supported.

- 5975 Series MSD
- Optional G3397A High Vacuum Gauge controller (required for CI operation)
- Gas Chromatograph Series
  6890 and 6850 Series GC, with options for MSD use
  7890A Series GC, with options for MSD use
  7820A Series GC, predefined bundles for the MSD use
- ALS Autosamplers
  7683 Series Automatic Liquid Sampler
  7693 Series Automatic Liquid Sampler
- Computer and MSD ChemStation software
  Refer to your MSD ChemStation documentation for additional information

Table 1 lists possible configurations for the 5975 Series MSD. Figure 1 identifies many of the common parts.

Table 1 Available high vacuum pumps

Model name	Product number	Description	Ionization modes
5975C TAD VL MSD	G3170A	Diffusion Pump MSD	Electron impact (EI)
5975C TAD inert MSD	G3171A	Standard Turbo MSD	Electron impact (EI)
5975C TAD inert XL MSD	G3172A	Performance Turbo MSD	Electron impact (EI)
5975C TAD inert XL MSD	G3174A	CI High Mass Performance Turbo Pump	Electron impact (EI) Negative chemical ionization (NCI) Positive chemical ionization (PCI)
7820 VL MSD	G3175A	Diffusion Pump MSD	Electron impact (EI)
7820 MSD	G3176A	Standard Turbo MSD	Electron impact (EI)

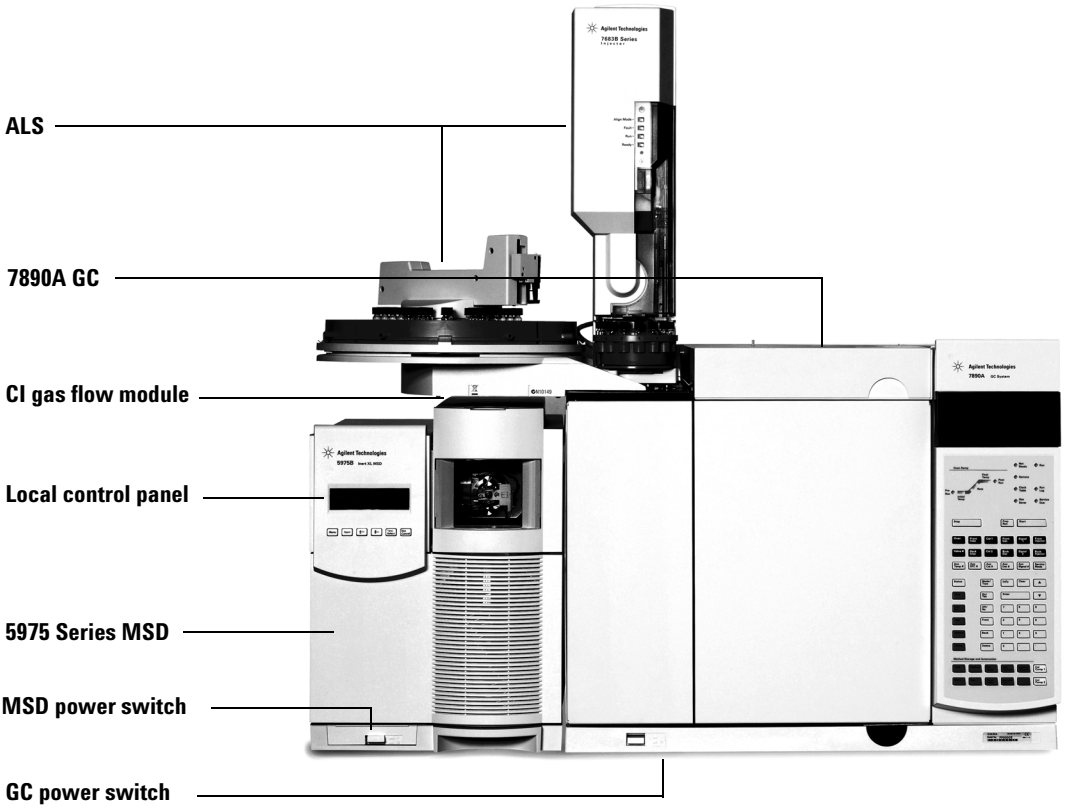

Figure 1 5975 Series MSD system

Important Safety Warnings

Before moving on, there are several important safety notices that you should always keep in mind when using the 5975 Series MSD.

Many internal parts of the MSD carry dangerous voltages

If the MSD is connected to a power source, even if the power switch is off, potentially dangerous voltages exist on the wiring between the MSD power cord and the AC power supply, the AC power supply itself, and the wiring from the AC power supply to the power switch.

With the power switch on, potentially dangerous voltages also exist on:

- All electronics boards in the instrument.
- The internal wires and cables connected to these boards.
- The wires for any heater (oven, detector, inlet, or valve box).

WARNING **All these parts are shielded by covers. With the covers in place, it should be difficult to accidentally make contact with dangerous voltages. Unless specifically instructed to, never remove a cover unless the detector, inlet, or oven are turned off.**

WARNING **If the power cord insulation is frayed or worn, the cord must be replaced. Contact your Agilent service representative.**

Electrostatic discharge is a threat to MSD electronics

The printed circuit (PC) boards in the MSD can be damaged by electrostatic discharge. Do not touch any of the boards unless it is absolutely necessary. If you must handle them, wear a grounded wrist strap and take other antistatic precautions. Wear a grounded wrist strap any time you must remove the MSD right side cover.

Many parts are dangerously hot

Many parts of the MSD operate at temperatures high enough to cause serious burns. These parts include but are not limited to:

- The inlets
- The oven and its contents
- The detectors
- The column nuts attaching the column to an inlet or detector
- The valve box

You should always cool these areas of the MSD to room temperature before working on them. They will cool faster if you first set the temperature of the heated zone to room temperature. Turn the zone off after it has reached the setpoint. If you must perform maintenance on hot parts, use a wrench and wear gloves. Whenever possible, cool the part of the instrument that you will be maintaining before you begin working on it.

WARNING **Be careful when working behind the instrument. During cool-down cycles, the MSD emits hot exhaust which can cause burns.**

WARNING **The insulation around the inlets, detectors, valve box, and the insulation cups is made of refractory ceramic fibers. To avoid inhaling fiber particles, we recommend the following safety procedures: ventilate your work area; wear long sleeves, gloves, safety glasses, and a disposable dust/mist respirator; dispose of insulation in a sealed plastic bag; wash your hands with mild soap and cold water after handling the insulation.**

Hydrogen

Hydrogen gas may be used as carrier gas, and/or as fuel for the FID. When mixed with air, hydrogen can form explosive mixtures.

WARNING **When using hydrogen (H_2) as the carrier gas or fuel gas, be aware that hydrogen gas can flow into the oven and create an explosion hazard. Therefore, be sure that the supply is off until all connections are made, and ensure that the inlet and detector column fittings are either connected to a column or capped at all times when hydrogen gas is supplied to the instrument.**

Hydrogen is flammable. Leaks, when confined in an enclosed space, may create a fire or explosion hazard. In any application using hydrogen, leak test all connections, lines, and valves before operating the instrument. Always turn off the hydrogen supply at its source before working on the instrument.

WARNING **The MSD cannot detect leaks in inlet and/or detector gas streams. For this reason, it is vital that column fittings should always be either connected to a column, or have a cap or plug installed.**

When using hydrogen gas, check the system for leaks to prevent possible fire and explosion hazards based on local Environmental Health and Safety (EHS) requirements. Always check for leaks after changing a tank or servicing the gas lines. Always make sure the vent line is vented into a fume hood.

Safety and Regulatory Certifications

The 5975 Series Mass Selective Detector conforms to the following safety standards:

- Canadian Standards Association (CSA): CAN/CSA–C22.2 No. 61010–1–04
- CSA/Nationally Recognized Test Laboratory (NRTL): UL 61010–1
- International Electrotechnical Commission (IEC): 61010–1
- EuroNorm (EN): 61010–1

The 5975 Series Mass Selective Detector conforms to the following regulations on Electromagnetic Compatibility (EMC) and Radio Frequency Interference (RFI):

- CISPR 11/EN 55011: Group 1, Class A
- IEC/EN 61326
- AUS/NZ

This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB–001 du Canada.

The 5975 Series Mass Selective Detector is designed and manufactured under a quality system registered to ISO 9001.

Information

The Agilent Technologies 5975 Series Mass Selective Detector meets the following IEC (International Electro-technical Commission) classifications: Equipment Class I, Laboratory Equipment Installation Category II, Pollution Degree 2.

This unit has been designed and tested in accordance with recognized safety standards and is designed for use indoors. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired. Whenever the safety protection of the 5975 Series Mass Selective Detector has been compromised, disconnect the unit from all power sources and secure the unit against unintended operation.

Refer servicing to qualified service personnel. Substituting parts or performing any unauthorized modification to the instrument may result in a safety hazard.

Symbols

Warnings in the manual or on the instrument must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions violates safety standards of design and the intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

See accompanying instructions for more information.

Indicates a hot surface.

Indicates hazardous voltages.

Indicates earth (ground) terminal.

Indicates explosion hazard.

Indicates radioactivity hazard.

Indicates electrostatic discharge hazard.

Indicates that you must not discard this electrical/electronic product in domestic household waste.

Electromagnetic compatibility

This device complies with the requirements of CISPR 11. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

1. Relocate the radio or antenna.
2. Move the device away from the radio or television.
3. Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
4. Make sure that all peripheral devices are also certified.
5. Make sure that appropriate cables are used to connect the device to peripheral equipment.
6. Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.

Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

Sound emission declaration for Germany

Sound pressure

Sound pressure Lp <70 dB am according to EN 27779:1991.

Schalldruckpegel

Schalldruckpegel LP <70 dB am nach EN 27779:1991.

Cleaning

To clean the unit, disconnect the power and wipe down with a damp, lint-free cloth.

Recycling the Product

For recycling, contact your local Agilent sales office.

Customer Responsibilities

The following are not included in the standard installation. They are the responsibility of the customer, unless previous arrangements have been made between the customer and the Agilent Technologies Customer Service Organization.

- Preparation of all site facilities including the provision of adequate space, supporting bench, and power to match the unit(s) purchased. See the *5975 Series MSD Site Preparation Guide* for details
- Operating supplies: high-purity carrier and reagent gas(es), syringes, pipettes, vials, and solvents. See the *5975 Series MSD Site Preparation Guide* for details
- Installation and testing of additional detectors on the 6890 Series GC
- Training for programs not specifically listed in this document
- Tests of customer-supplied samples, equipment, and/or method development
- Any tasks not described in this manual

In addition, the customer is required to:

- Provide someone to help lift the GC and MSD onto the bench
- Have the primary user and, if possible, all other users of the MSD present during installation to receive familiarization instruction from the Agilent Technologies service representative

Before You Start

Verify that all the conditions specified in the *5975 Series MSD Site Preparation Guide* have been met:

- Adequate space is available for the MSD system
- Suitable supporting bench
- Adequate electrical power is available at the correct voltages and frequencies
- Environmental control systems are adequate
- Adequate preparations for safe exhaust venting
- Supplies necessary for instrument operation are available, including solvents, helium carrier gas, and methane reagent gas (for CI MSDs)

NOTE Installation and verification will only be performed using helium carrier gas.

- Computer supplies, including diskettes and printer paper
- Conveniently located telephone

Lifting the GC and MSD will require the assistance of another person to prevent injury.

Product	Weight, kg	Weight, lb
5975 Series MSD		
G3171A Standard turbo pump	39	85
G3172A Performance turbo pump	41	90
G3174A CI High Mass performance turbo pump	46	100
6850 Series GC	23	51
6890 Series GC	50	110
7820A GC	50	110
7890A GC	50	110

Other Documentation

Additional information is contained in the following documentation:

- 5975 Series Mass Selective Detector Hardware Manuals, which are located on the 5975 Series Mass Selective Detector User Information CD-ROM
- *5975 Series Mass Selective Detector Site Preparation Guide*
- GC Series manuals
- GC automatic liquid sampler documentation
- GC accessories documentation
- Agilent MSD ChemStation software manuals and online help
- The sensitivity specifications for your instrument, Agilent publication 5988-9991EN
- For updated information, see the Agilent Technologies Web site at http://www.agilent.com/chem

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This chapter contains instructions for installing the 5975 Series MSD system.

Overview

Listed below are the steps performed for hardware installation. The actual order of the steps depends upon the type of MSD, GC, and accessory ordered.

- Unpacking and inspecting shipped materials
- Installing the GC
- Installing the MSD
- Installing the computer and peripherals
- Integrating the GC and MSD
- Evaluating performance
- Familiarizing the customer with the system

Installing CI MSD systems requires additional steps:

- PFDTD calibrant added to calibration vial
- Methane/isobutane gas purifier installation
- Methane reagent gas line and gas purifier purge
- Methane reagent gas line hookup

After system performance has been verified in EI mode, the MSD must be switched to CI mode if applicable, and evaluated:

- Chemical ionization (CI) ion source and CI interface tip seal installation
- Bakeout and purge at least 2 hours
- CI setup
- Positive chemical ionization (PCI) autotune and sensitivity verification
- Negative chemical ionization (NCI) autotune and sensitivity verification
- High-mass autotune and sensitivity verification

The G3397A High Vacuum Gauge controller is required for CI operation.

Unpacking and Inspecting the Materials

Shipping containers should not be opened until an Agilent Technologies representative is present to verify the contents of each container. Warranty claims for missing items will not be honored unless an Agilent Technologies representative verifies the contents of each shipping container as it is unpacked.

1. Unpack the GC, MSD, and PC boxes. See Figure 2.
2. Check each item off on the packing list, and verify serial numbers.
3. Record the serial numbers in the installation documentation.
4. Retain shipping containers and material until contents are checked for completeness and instrument performance is verified.
5. If there are any discrepancies, contact the distribution center.

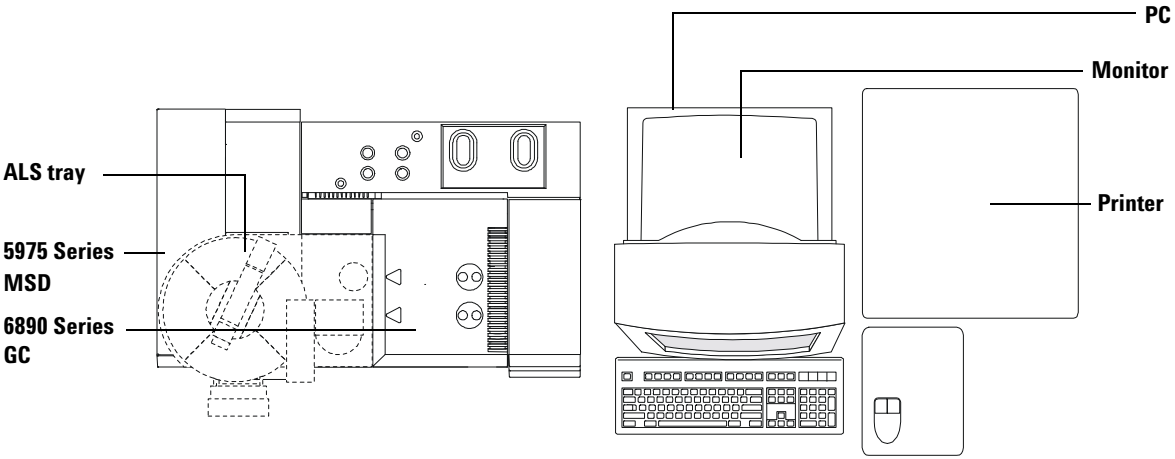

Figure 2 Example GC, MSD, PC setup

Installing the GC

Materials needed:

Column cutter (5181-8836)
Flat-blade screwdriver
GC Series shipping kit

Please refer to the GC/MS application note, “Optimizing splitless injections on your GC for high-performance MS analysis” (5988-9944EN) before installing the GC.

1 Place the GC on the bench.

WARNING **To prevent injury, get lifting assistance.**

2 Remove the left side panel of the GC.

3 Remove the metal upper front knockout from the interior oven wall, using a flat-blade screwdriver (see Figure 3).

4 Do not remove the insulation between the exterior and interior oven walls, but move it aside. Use the screwdriver, not your fingers.

5 Pop out the two large plastic knockouts from the GC left side panel.

6 Reinstall the GC left side panel cover and route the GC end of the GC/MSD interface heater cable through the lower hole.

NOTE The 7890 GC is shown here. The positions of the GC/MSD interface and heater cable will be slightly different depending upon the GC series used.

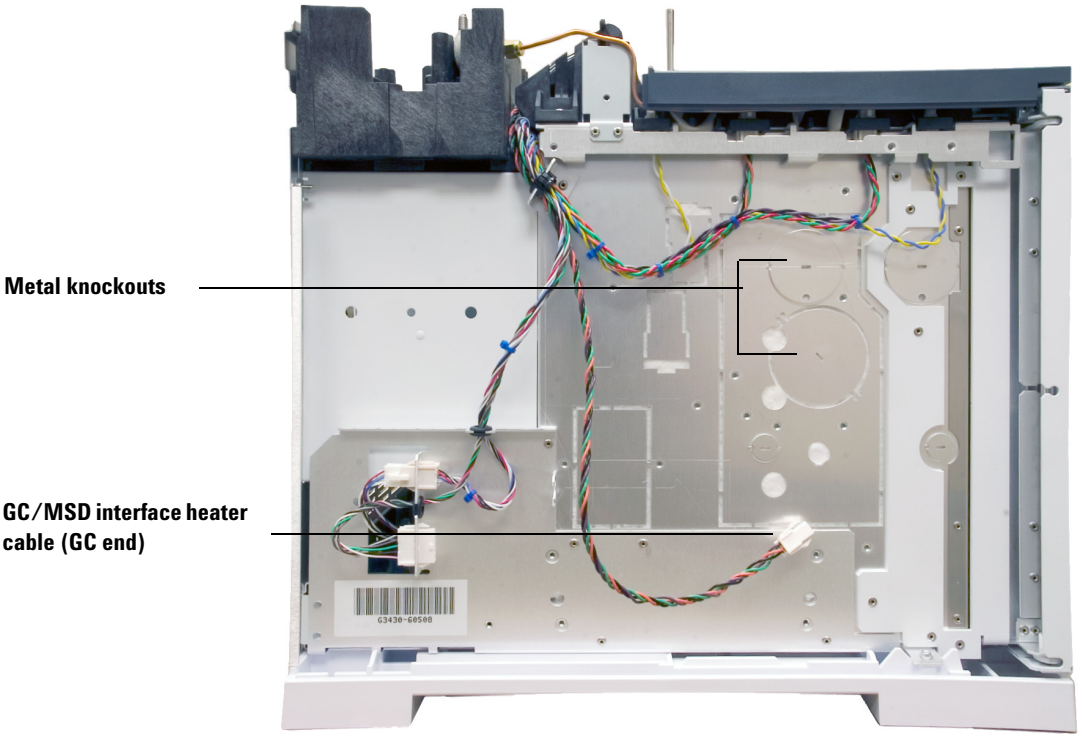

Figure 3 Removing the knockouts

Connecting the Helium Lines to the GC

1 Connect the 6-foot copper tubing (or a custom length) to the carrier gas supply line (Figure 4).

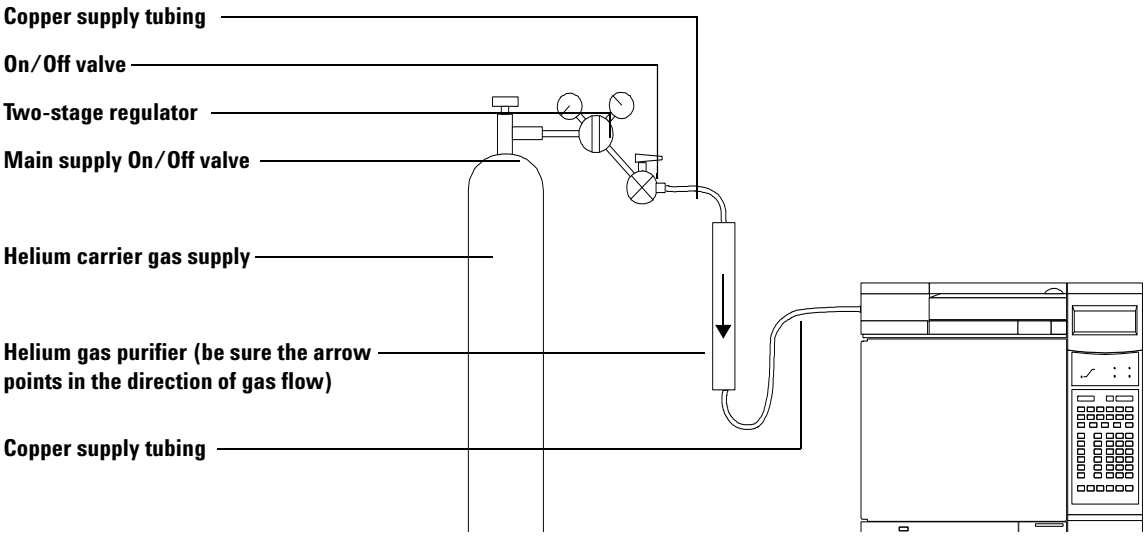
Copper supply tubing
On/Off valve
Two-stage regulator
Main supply On/Off valve
Helium carrier gas supply
Helium gas purifier (be sure the arrow points in the direction of gas flow)
Copper supply tubing

Figure 4 Connect helium

2 Turn on the carrier gas flow at a low pressure, 35 to 55 kPa (5 to 8 psi).

3 Let the line purge for 5 to 10 minutes.

4 Connect the other end of the tubing to the input of the gas purifier.

CAUTION Only remove the caps in the gas stream or the gas purifier will be contaminated by air. This will ruin the gas purifier.

5 Connect one end of the copper tubing to the output of the gas purifier.

6 Let the line and gas purifier purge for 5 to 10 minutes.

7 Connect the other end of the tubing to the input of the EPC controller.

Purge the flow system for 20 minutes. You can continue with the next step while you wait.

Configuring the GC

1 If there is an ALS, install it now.

Follow the instructions provided with the ALS.

2 Install the Merlin Microseal (optional). Follow the instructions provided with the Merlin Microseal.

CAUTION Do not use syringes with tapered needles with a Microseal.

3 Connect the GC power cord to the appropriate electrical outlet.

4 Turn on the GC and verify that the GC passes self-test.

Keep the GC oven turned off.

5 Configure the column parameters for the MSD column that is installed in the GC.

On the GC keypad, select **[Config]** **[Col 1]** and configure the column for the GC Series that you have for the following parameters:

Length (m)
Diameter (µ)
Film thickness
Inlet
Detector
Vacuum correct
Pres correct

6 Increase the supply pressure of the carrier gas to 50 to 60 psi. (This may be set higher, depending on the GC you are using).

7 Set the column flow rate to 5 mL/min and split flow to 200 mL/min.

Conditioning the Column

1. Remove the septum covering the free end of the GC column and cut about 1 cm off the end of the column.
2. Place the free end of the column into a beaker of solvent and check for bubbles to verify helium flow. Do not leave the beaker in the oven.
3. Set the inlet temperature to 300 °C.
4. Turn on the oven and ramp the oven temperature from 40 °C to 300 °C (or 10 °C above the maximum temperature used for your analysis) at 15 °C per minute. Hold for 10 minutes, then reset to 35 °C.

While the oven is heating, proceed with the next steps.

5. Once the oven temperature exceeds 80 °C, inject 5 µL methanol into GC; repeat two more times at 5-minute intervals.

This will help remove any contamination from the column before it is installed into the MSD.

6. When the temperature program is complete, set the inlet to 250 °C.
7. Turn the GC power off.

Preparing the MSD for Installation

Materials needed:

5975 Series MSD Hardware Manual
Tygon tubing or hose for pump exhaust (11-mm id)
Wrench, 1/4-inch × 5/16-inch open end
5975 Series MSD Shipping Kit
5975 Series MSD CI Shipping Kit

1 Unpack the MSD and foreline pump, and place them on the bench near the GC.

WARNING **To prevent injury, get lifting assistance.**

2 Remove the analyzer cover of the MSD. See the 5975 Series MSD Hardware Manual for more information.

3 Equalize the pressure in the MSD by turning the vent valve knob counterclockwise 1/2 turn.

The MSD is not under vacuum. It has been backfilled with clean, dry nitrogen for shipping.

CAUTION The MSD is shipped with empty calibration vials. The MSD cannot be tuned without calibration fluid.

4 Add PFTBA (05971-60571) to the EI calibration vial at the front of the MSD.

See the 5975 Series MSD Hardware Manual for more information.

Special procedure for CI MSD

5 Add PFDTD (8500-8130) to the vial on the CI calibration valve.

See the 5975 Series MSD Hardware Manual for more information.

Preparing the Vacuum System

Materials needed:

5975 Series MSD Hardware Manual
Diagonal cutters
Plastic gloves

1 Remove the plugs from the inlet and the outlet of the pump.

2 Verify that the available ac power matches the voltage rating of the foreline pump.

3 Attach the correct line voltage identification sticker to the MSD back panel.

4 Place the oil drip pan under the foreline pump as shown in Figure 5.

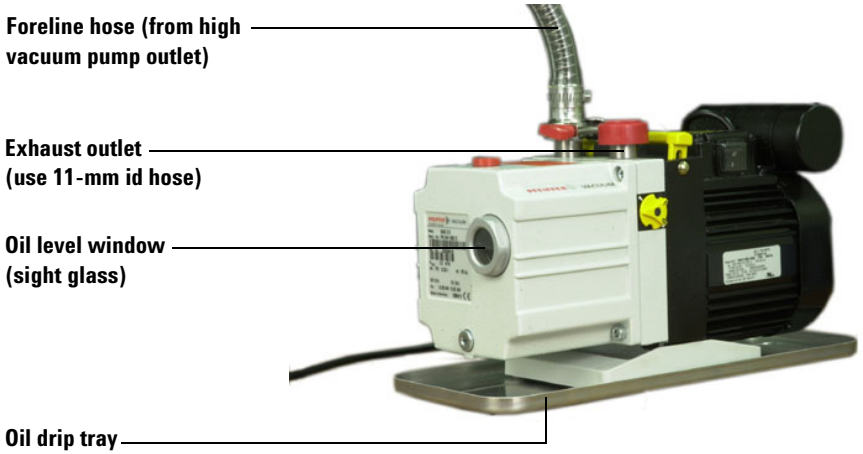

Figure 5 Preparing the vacuum system

5 Remove the cable ties holding the foreline hose.

6 Remove the blank flange from the free end of the hose, and connect the hose to the inlet port of the pump.

7 If nontoxic and nonflammable carrier gas, solvents and analytes will be used, install the pump exhaust oil trap on the outlet of the pump. Otherwise, install a hose (11-mm id) to take the foreline pump exhaust outside or to a fume (exhaust) hood. Do not use the trap on a CI MSD.

CAUTION Remove the red plug from the outlet of the pump before switching on the MSD power. Operation with the plug in place will destroy the pump.

WARNING **The pump exhaust contains carrier gas and traces of solvents, analytes, and pump oil. The supplied trap stops only pump oil. It does not trap or filter out toxic chemicals. If you are using toxic solvents or toxic or flammable carrier gas, or analyzing toxic chemicals, vent the pump exhaust to a fume hood.**

8 Connect the foreline pump power cord to the receptacle on the rear of the MSD. See Figure 6.

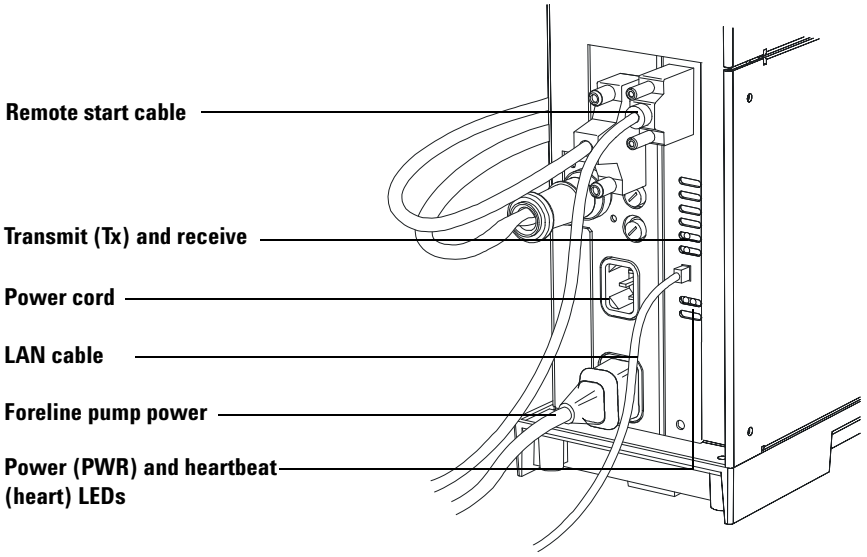

Figure 6 Foreline pump power plug

WARNING **The foreline pump must be plugged into the receptacle provided in the back of the MSD in order to have adequate overcurrent protection. Plugging the pump into a wall outlet will void the warranty on the pump.**

9 Install the optional G3397A High vacuum gauge controller (required for CI MSDs). Be sure not to stress the cable.

WARNING **The gauge controller must be properly grounded. See the manufacturer's manual supplied with the gauge controller.**

Plumbing the Methane Line to the CI MSD Flow Module

Special procedure for CI MSD

Refer to the *5975 Series MSD Hardware Manual.*

Materials needed:

Methane supply with regulator
Methane/Isobutane gas purifier (G1999-80410)
Stainless-steel tubing, 1/8-inch
Swagelok fittings and ferrules for 1/8-inch tubing
Wrench, 7/16-inch open-end, two needed

CAUTION Only remove the caps in the gas stream, or the gas purifier will be contaminated by air. This will ruin the gas purifier.

WARNING **Methane is flammable and explosive. Extinguish all sources of flame or spark in the room. Only perform this procedure in a well-ventilated room. Obey all local safety and environmental regulations.**

CAUTION Do not remove the Swagelok caps from the Gas A and Gas B inlets until you are ready to hook up the gas lines.

1. Install the methane/isobutane gas purifier. Follow the instructions on the gas purifier.
2. Set the pressure on the methane regulator to 20 psig (do not exceed 30 psig).
3. Connect one piece of the 1/8-inch, stainless-steel tubing to the methane supply regulator.
4. Turn on the gas flow slightly.
5. Connect the other end of the tubing to the inlet of the gas purifier.
6. Connect the second piece of stainless-steel tubing to the outlet of the gas purifier.

7 Let the lines purge into a fume hood for 5 to 10 minutes.

8 Connect the other end of the tubing to the Gas A fitting on the flow module as shown in Figure 7.

9 If another reagent gas is to be used, use more stainless steel tubing to connect it to the Gas B fitting.

If you are going to connect isobutane, you will need another gas purifier for the Gas B line. Observe the manufacturer's suggested pressure settings.

CAUTION Do not connect isobutane without a gas purifier. Do not use the gas purifier with ammonia.

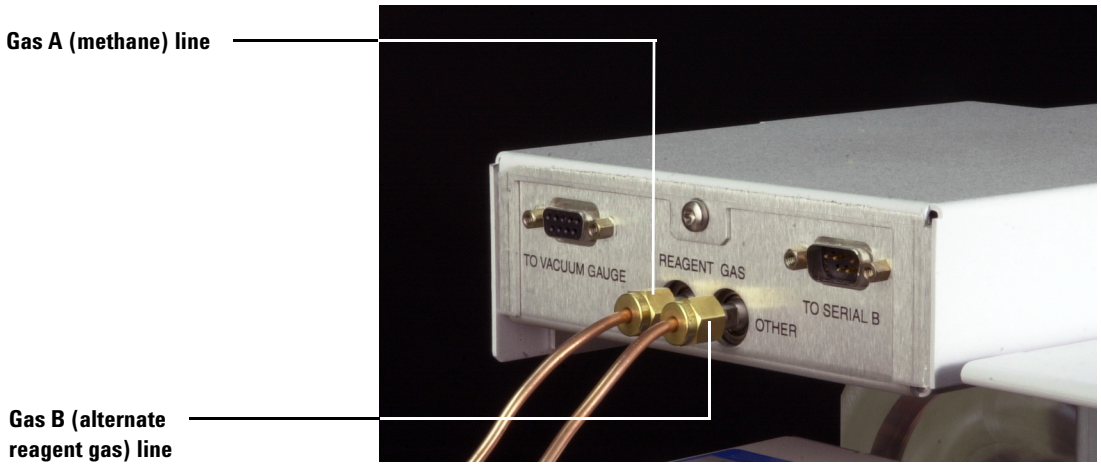

Figure 7 Connecting the methane line

Connecting the MSD and the GC

1 Verify that the GC power is turned off.

2 Connect the two ends of the GC/MSD interface cable as shown in Figure 8.

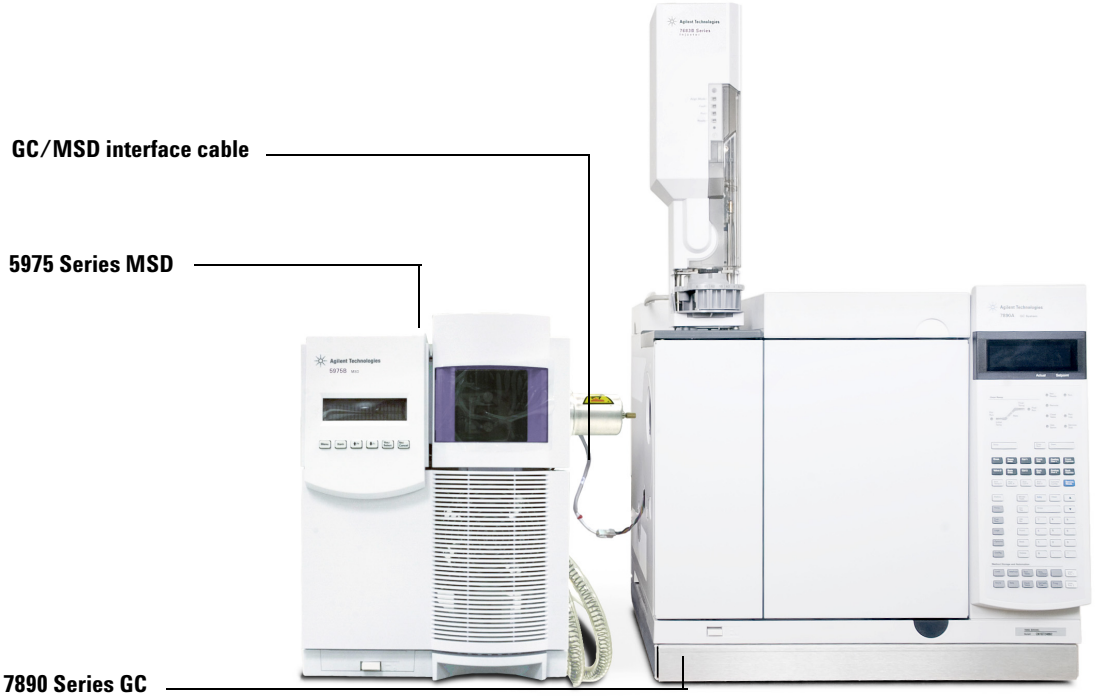

Figure 8 Connecting the MSD and the GC

3 Carefully position the MSD close to the GC as shown in Figure 8.

When positioned properly, the end of the GC/MSD interface cover will touch the metal of the oven wall, and the end of the interface will protrude into the GC oven. The sides of the GC and MSD should be parallel. Note that the end of the interface on a CI MSD will not protrude quite as far into the GC oven as that on an EI MSD.

4 Connect a remote cable between the MSD and one of the remote connectors on the back of the GC.

5 Connect the MSD power cord to an appropriate AC outlet.

6 Loosen the sideplate thumbscrews completely (shown in Figure 9) and open the analyzer.

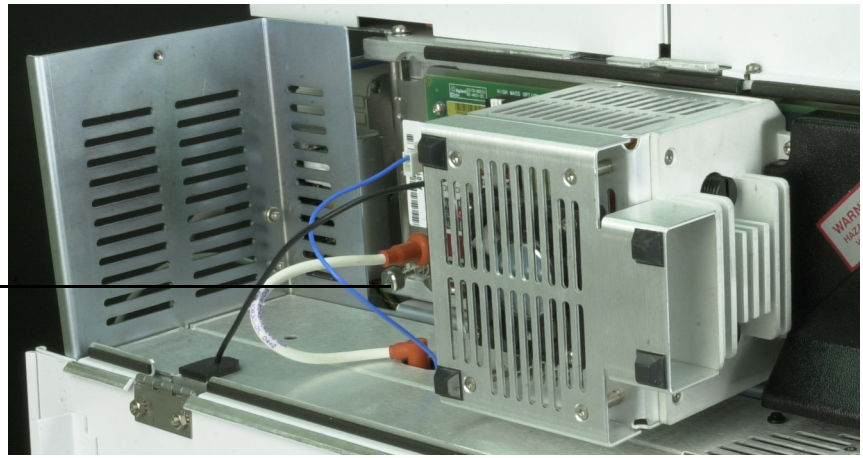

Figure 9 Loosen sideplate thumbscrews

7 Remove the interface column nut and blank ferrule from the end of the GC/MSD interface.

8 Install the column in the GC/MSD interface. See the 5975 Series MSD Hardware Manual for more information.

CAUTION Opening the analyzer with either sideplate thumbscrew tight will irreparably damage the baseplate. Damage of this type is not covered by the warranty.

9 Turn the GC on.

10 Set the GC column flow to 1.0 mL/min with constant flow enabled.

11 Pump down the MSD.

Press on the side plate of the MSD to achieve a good seal. Verify that the foreline pump and the front fan turn on, and that the foreline pump stops gurgling within 1 minute.

12 After 10 minutes of pumping, turn off the MSD.

13 Turn off the GC temperature zones.

14 Set column flow to 1.0 mL/min with constant flow enabled.

15 Reinstall the MSD analyzer cover.

Installing the ChemStation PC

1. Unpack the PC, monitor, printer, and the modem (if present).
2. Position the PC components on the bench.
3. Install the PC.

   See the PC installation documentation. Please pay attention to the voltage requirements in the PC documentation.
4. Position the network switch on the bench, and plug in its power supply.

   See the switch installation documentation.
5. Connect a shielded LAN cable between the LAN connector on the MSD and connector #1 on the network switch.
6. Connect a shielded LAN cable between the RJ-45 connector on the back of the GC to connector #2 on the network switch.
7. Connect a shielded LAN cable between the RJ-45 connector on the back of the PC and connector #3 on the network switch.
8. Install the printer.

   See the printer installation documentation.
9. Turn on the printer, monitor, and PC, in that order.

   The switch does not have a power switch; it is “on” whenever it is connected to AC power.
10. Install the software. See the software installation manual.

Verifying EI System Performance

Material needed:

1 pg/µL (0.001 ppm) OFN sample (5188-5348)

Verify the tune performance

1. Verify that the system has been pumping down for at least 60 minutes.
2. Set the GC oven temperature to 150°C, and the column flow to 1.0 mL/min.
3. In the **Instrument Control** view, select **Checkout Tune** from the **Checkout** menu.

   The software will perform an autotune and print out the report.
4. When the autotune has completed, save the method, and then select **Evaluation Tune** from the **Checkout** menu.

   The software will evaluate the last autotune and print a System Verification – Tune report.

Verify the sensitivity performance

1. Set up to inject 1 µL of OFN, either with the ALS or manually.
2. In the **Instrument Control** view, select **Sensitivity Check** from the **Checkout** menu.
3. Click the appropriate icons in the **Instrument Edit** window to edit the method for the type of injection.
4. Click **OK** to run the method.
5. When the method is completed, an evaluation report will print out.

   Verify that rms signal-to-noise ratio meets the published specification. See Agilent publication 5988-9991EN.

Switching from EI to CI Operating Mode

Special procedure for CI MSD

Refer to the *5975 Series MSD Hardware Manual*.

1 Vent the MSD.

2 Open the analyzer.

3 Remove the EI ion source.

CAUTION Electrostatic discharges to analyzer components are conducted to the side board where they can damage sensitive components. Wear a grounded antistatic wrist strap (see the *5975 Series MSD Hardware Manual*) and take other antistatic precautions before you open the analyzer.

4 Install the CI ion source.

5 Install the interface tip seal.

6 Pump down the MSD.

7 Set methane flow to 40%.

8 Bake out and purge the MSD for at least 2 hours.

9 If the vacuum gauge controller is on, turn it off.

10 Set up the software for CI operation. Load PCICH4.U.

11 Select **Purge Cal Valve** from the **Vacuum** menu in the **Tune and Vacuum Control** view.

CAUTION Do not proceed without purging the calibration valve, or the analyzer will be damaged.

12 Set up the methane reagent gas flow.

13 Select the **Tune/CI** from the **Tune** menu to edit PCICH4.U as needed.

14 Perform the autotune. Select **Tune/CI Tune**.

15 Verify that there is no visible peak at *m/z* 32, and that the peak at *m/z* 19 is less than 50% of that at *m/z* 17.

Verifying CI System Performance

Special procedure for CI MSD

Refer to the *5975 Series MSD Hardware Manual.*

Verify PCI performance

1. Perform a positive CI autotune. See the *5975 Series MSD Hardware Manual.*
2. Verify positive CI performance. See the *5975 Series MSD Hardware Manual.*
3. Verify that rms signal-to-noise ratio meets the published specification.

Verify NCI performance

1. Perform a negative CI autotune.
2. Verify negative CI performance.
3. Verify that rms signal-to-noise ratio meets the published specification. See Agilent publication 5988-9991EN.

NOTE There are no criteria for a “passing” CI autotune. If the CI autotune completes, it passes. EMV at or above 2600 V, however, indicates a problem with the system, and will cause problems meeting the sensitivity specification.

Verifying High Mass System Performance

Refer to the *5975 Series MSD Hardware Manual.*

To check high mass performance, the system makes 1 injection of the high mass checkout sample and analyzes the results.

For high mass systems, verify high mass system performance as follows:

1. Load the high mass checkout method, PFHT.M, and resolve any configuration conflicts.
2. Load the high mass checkout sample into vial 2.
3. When the GC and MSD are ready, select **Checkout/High Mass Check** from the **Intrument** view.
4. Verify that the rms signal-to-noise ratio meets the specifications described in the *5975 Series MSD Hardware Manual.*

Familiarizing the Customer

Follow the "Customer Familiarization Checklist" on page 53.

Important points about the CI MSD to cover include:

- Cleanliness is the most important factor for success in CI, especially negative mode. This includes air leaks, water, and residual PFDTD calibrant.
- NCI reagent gas setup:

  There are no negative reagent ions formed. To set up for NCI mode, tune in PCI mode, then load NCI tune file to switch parameters, set gas flow to 40%; adjust if necessary for specific analyte.
- NCI operation:

  Reagent gas flow, source temperature, and emission current are the three most important parameters for optimizing NCI.
- No PFDTD calibrant ions are formed in PCI with isobutane or ammonia. Tune with methane, and copy parameters to new file: for example, PCINH3.U.
- The gas purifier can not be used with ammonia.
- Must ballast foreline pump daily if running ammonia. Refer to the maintenance chapter of the *5975 Series MSD Hardware Manual.*
- For updated information, see the Agilent Technologies Web site at http://www.agilent.com/chem.

3 Checklists

Installation Checklist 46
Customer Familiarization Checklist 53

This section provides a series of checklists which will help you verify your completion of the various steps of the installation process. Also included are checklists which are intended to aid you in becoming familiar with the system.

Installation Checklist

Verifying that site preparation is complete

- ❒ Adequate space is available for the MSD system.
- ❒ Suitable supporting bench.
- ❒ Adequate electrical power is available at the correct voltages and frequencies.
- ❒ Environmental control systems are adequate to maintain a correct, stable operating environment.
- ❒ Safe exhaust venting preparations are adequate.
- ❒ Supplies necessary for instrument operation are available, including solvents, carrier and reagent gasses, and printer paper.
- ❒ Conveniently located telephone.

Unpacking and inspecting the shipped materials

- ❒ Shipping containers must be opened only with an Agilent Technologies representative present to verify the contents of each container.
- ❒ Check each item off on the packing list and verify serial numbers.
- ❒ Record the serial numbers in the installation documentation.
- ❒ Retain shipping containers and material until contents are checked for completeness and instrument performance is verified.
- ❒ Notify the distribution center of any missing or damaged items.

❒ Shipment damaged or incomplete:

Distribution center notified (date):

_____

Person contacted:

_____

DM notified (date):

_____

Damaged or missing material:

_____

_____

_____

GC installation

The following steps are general, and may differ slightly depending upon the series of GC used.

❒ GC placed on an appropriate bench

❒ Upper front knockout in the interior oven wall removed

❒ The two large plastic knockouts removed from the left side panel

❒ Left side panel reinstalled; GC/MSD interface cable routed through the rear hole

Connecting helium lines to the GC

❒ Carrier gas supply plumbed with copper tubing

❒ Plumbing purged with helium at 35 to 55 kPa (5 to 8 psi) for 5 to 10 minutes

❒ Gas purifier plumbed and purged

❒ GC plumbed

Configuring the GC

❒ ALS installed (optional)

❒ Merlin Microseal installed (optional)

❒ GC plugged in and turned on

❒ GC passes self-test

❒ Column parameters configured

❒ Carrier gas line pressure set to approximately 414 kPa (60 psi)

❒ Column flow rate set to 5 mL/min (split flow to 200 mL/min)

Conditioning the column

❒ Free end of column trimmed

❒ Helium flow through column verified

❒ Inlet temperature set to 300 °C

❒ Oven temperature ramped from 40 °C to 300°C at 15 °C per minute and held for 10 minutes

❒ 5 µL of methanol injected into GC; repeated two more times at 5-minute intervals

❒ Inlet set to 250 °C

❒ GC power off

MSD installation

Preparing the MSD for installation

❒ MSD and foreline pump unpacked and placed on the bench

❒ MSD top cover removed

❒ Vent valve opened to equalize pressure

❒ PFTBA vial for EI cal valve filled

❒ PFDTD vial for CI cal valve filled

Preparing the vacuum system

❒ Plugs removed from the foreline pump

❒ Foreline pump line voltage verified to match available AC power

❒ Line voltage identification sticker installed on MSD

❒ Oil drip pan under the foreline pump

❒ Foreline hose connected to the pump

❒ Pump exhaust vented to a fume hood or the oil trap installed

❒ Foreline pump power cord plugged into MSD

❒ G3397A High Vacuum Gauge Controller installed (required for CI MSDs)

Plumbing the methane line to the CI MSD

❒ Methane/isobutane gas purifier installed

❒ Regulator pressure set to 20 psig (do not exceed 30 psig).

❒ Gas purifier and lines purged

❒ Methane reagent gas lines plumbed to flow module

Connecting the MSD and the GC

❒ GC power turned off

❒ GC/MSD interface heater cable connected

❒ MSD positioned with interface in GC oven

❒ Sideplate thumbscrews loosened completely; analyzer opened

❒ Column installed in the GC/MSD interface

❒ Remote cable connected between the GC and the MSD

❒ Foreline pump and AC supply power cords connected to the MSD.

❒ MSD plugged in

❒ MSD power on (press on the sideplate)

- ❒ Foreline pump and the front fan operation verified
- ❒ Foreline pump stops gurgling within 60 seconds verified
- ❒ MSD turned off after 10 minutes of pumping down
- ❒ GC heated zones turned off
- ❒ GC carrier gas flow set to 1.0 mL/min with constant flow enabled

MSD ChemStation PC installation

- ❒ PC, monitor, and printer unpacked
- ❒ PC installed
- ❒ Network switch unpacked and plugged in
- ❒ LAN cable from the MSD connected to switch Port #1
- ❒ LAN cable from the GC connected to switch Port #2
- ❒ LAN cable from the PC connected to switch Port #3
- ❒ Printer installed
- ❒ Printer, monitor, and PC turned on (in that order)
- ❒ Software installed per the software installation manual

Performance verification

EI system verification

- ❒ Pumpdown for at least 60 minutes
- ❒ GC oven set to 150 °C and the column flow to 1.0 mL/min
- ❒ Checkout Tune performed
- ❒ Tune Verification performed
- ❒ Sensitivity Check verification of EI Sensitivity performance

Switch CI MSD to CI operating mode (if applicable)

- ❒ MSD vented

- ❒ EI ion source removed
- ❒ CI ion source installed
- ❒ CI interface tip seal installed
- ❒ MSD pumped down and baked out for 2 hours
- ❒ Software set up for CI operation
- ❒ Purge Cal Valve performed
- ❒ Methane reagent gas flow set up
- ❒ Acceptable air and water background verified

PCI performance verification (if applicable)

- ❒ PCI autotune performed
- ❒ PCI sensitivity verified

NCI performance verification (if applicable)

- ❒ NCI autotune performed
- ❒ NCI sensitivity verified

High Mass performance verification (if applicable)

- ❒ High Mass Checkout performed

Instrument Log Book updated

- ❒ MSD serial number recorded on S/N report
- ❒ S/N Report(s) and Tune Report(s) faxed to GCMS LSCA Technical Marketing at (USA) 408-553-3188 or your region's local Technical Marketing Support Provider

5975 Series MSD serial number/product number:

_____

EI serial number (rms):

_____

PCI serial number (rms):

_____

NCI serial number (rms):

_____

Customer Familiarization Checklist

The purpose of customer familiarization is to demonstrate the steps required to:

- Perform a basic analysis using an Agilent standard sample or an internal data file
- Evaluate the acquired data
- Perform routine maintenance

Much of the familiarization is accomplished while the hardware is being installed and checked out. For this reason, at least one operator must be present throughout installation and familiarization.

Familiarization is intended to give operators a basic overview of the operation and maintenance of new instruments, systems, and applications software. It is not a substitute for a full operator training course.

Topics not included in familiarization

- Training on the PC, the mouse, Windows Operating System, DOS, Excel, Access, or any other Windows applications
- Advanced mass spectral processing
- Analysis of unknown samples
- Analysis of customer standards or samples
- Network setup of the MSD ChemStation with other PCs
- Network setup of the MSD ChemStation with the building network
- Methods development
- Commands and their use in creating macros using a text editor
- Customization of the system (including macro writing)
- Executing a macro via methods (deuser.mac) or from the command line
- Special macros
- Any US EPA quantitation functions
- Aromatic gasoline quantitation functions
- Intelligent sequencing – Drug Analysis Acquisition
- Any Drug Analysis quantitation functions

Hardware overview

- ❒ MSD
- ❒ CI MSD (if applicable)
- ❒ Gas Chromatograph
- ❒ ALS (if applicable)
- ❒ Bar code reader (if applicable)
- ❒ PC hardware and peripherals

System operation

- ❒ Switching on instruments, PC, and peripherals
- ❒ Starting Windows Operating System and using online help
- ❒ Starting MSD ChemStation software
- ❒ Switching between EI and CI operation (CI MSD only)

MSD ChemStation software overview

- ❒ Software configuration of the instruments (MS Config) demonstrated
- ❒ EI/CI instrument configuration with MS Config demonstrated (if applicable)
- ❒ Different Quantitation Packages and how to switch between them demonstrated
- ❒ Views and menu structure demonstrated

MSD ChemStation software autotune descriptions

- ❒ Various autotunes described
- ❒ Importance of retaining tuning records emphasized
- ❒ Ion source contamination, diagnosis of contamination, and use of control charts discussed
- ❒ EI autotune demonstrated and tune report explained

- ❒ Manual tune explained
- ❒ View Tunes utility demonstrated and its importance explained
- ❒ PCI Autotune performed (if applicable)
- ❒ NCI Autotune performed (if applicable)
- ❒ Optimization of reagent gas and application dependency on gas flow, source temperature, and emission current discussed
- ❒ Importance of retaining tuning and maintenance records discussed
- ❒ Importance of backing up data, including tune files

Methods

- ❒ Edit entire method demonstrated with OFN_SN.M, explaining the GC and MS Scan Parameters.
- ❒ Method save demonstrated

Data acquisition

- ❒ Analytical method developed to run both scan and SIM
- ❒ Steps involved in acquiring data and editing an entire method described
- ❒ File designated to store the data; data file naming demonstrated
- ❒ Acquisition parameters saved as part of a method
- ❒ Use Scan/SIM (amu range 50:300/amu ion 272) on OFN for acquisition
- ❒ Snapshot demonstrated

Data analysis

- ❒ Screen layout explained (TIC, spectral windows, command line, title bar, etc.)
- ❒ Loading data files demonstrated
- ❒ TIC, spectra, and extracted ion profiles demonstrated
- ❒ Integration performed and explained

- ❒ Library search (searching a spectrum) demonstrated
- ❒ Difference between standalone and online data analysis explained

Sequence

- ❒ Sequence loading demonstrated
- ❒ Sample Log Table editing demonstrated
- ❒ Sequence saving demonstrated
- ❒ Running, halting, and position and run demonstrated

MSD ChemStation maintenance

- ❒ Directory structure and maintenance of MSDCHEM files discussed
- ❒ Data backup options discussed
- ❒ Use of Windows Operating System DEFRAG and SCANDISK utilities discussed

EI instrument user maintenance

- ❒ GC inlet, column installation and maintenance, flows, and parts replacement described
- ❒ MSD vent and pumpdown procedures performed and described using the ChemStation software
- ❒ Maintenance section of Hardware manual demonstrated
- ❒ Ion source cleaning demonstrated
- ❒ Electron multiplier horn replacement demonstrated
- ❒ Vacuum system preventive maintenance demonstrated
- ❒ EI Instrument User Maintenance
- ❒ GC inlet, column installation and maintenance, flows, and parts replacement described
- ❒ MSD vent and pumpdown procedures performed and described using the ChemStation software

- ❒ Differences between the EI and CI source parts described
- ❒ Differences in installation and removal of the EI versus CI source described
- ❒ Maintenance section of Hardware manual demonstrated
- ❒ Ion source cleaning demonstrated
- ❒ Vacuum system preventive maintenance demonstrated; special precautions for certain reagent gases discussed

Troubleshooting (Diagnostics)

- ❒ Tune charts under **Qualify** menu demonstrated
- ❒ Online help for troubleshooting demonstrated

Tune charts

- ❒ Displaying results explained
- ❒ Ion Source parameters explained
- ❒ Mass Filter parameters explained

Additional support information

- ❒ Use of manuals and online help explained
- ❒ Warranty and warranty enhancements explained
- ❒ Agilent Technologies Support services and how to obtain help explained
  - Hardware
  - Software
  - Assist Packages
  - Additional Training
  - Consulting

Company name:

Customer signature/date:

Engineer signature/date:

Sales order number:

Agilent Technologies

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